



Roofing Insulation for Commercial Construction

ROXUL TOPROCK® DD and MONOBOARD®

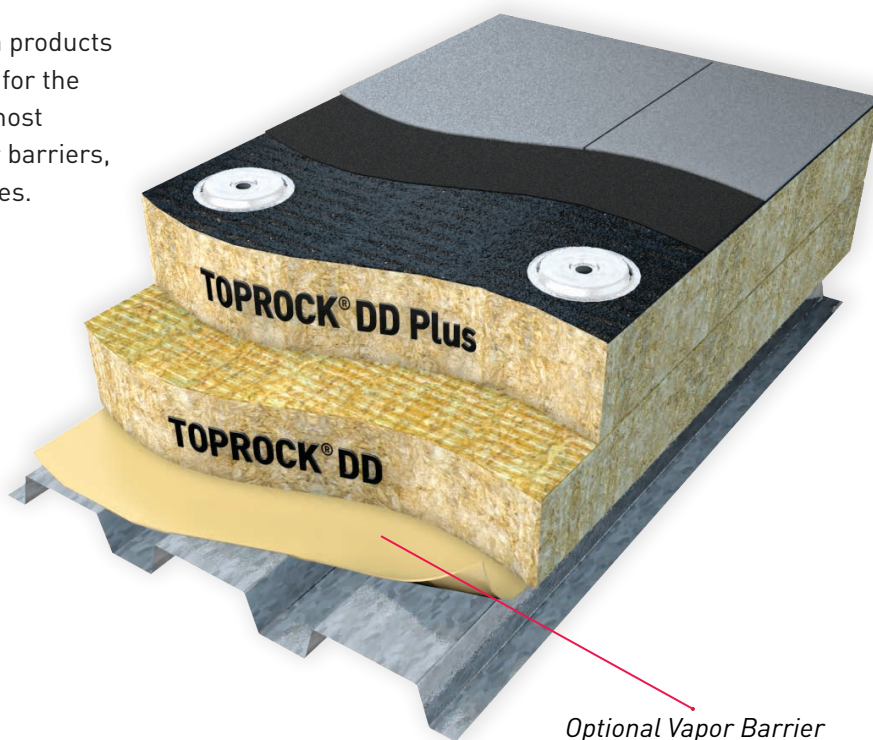
BEDRRoofs™
Building Envelope
Design using **ROXUL**®

NEW
& IMPROVED
MONOBOARD®

High Performance Roofing Insulation Products

TOPROCK® DD and MONOBOARD® insulation products are specifically designed and manufactured for the roofing industry. Both are compatible with most roofing systems (flat and tapered), air/vapor barriers, membranes, fasteners, and various adhesives.

- ✓ Long-term Stable R-value
- ✓ Non-combustible
- ✓ Impact Resistant
- ✓ Water Repellent
- ✓ Vapor Permeable
- ✓ No off-gassing
- ✓ Resistant to rot, mold and fungi
- ✓ Sound Absorbent
- ✓ Environmentally Sustainable



Green Building Contributions

ROXUL stone wool insulation is pleased to have third-party certification of its products' recycled content (40%) for the Milton Facility, completed by ICC-ES SAVE™ and has a number of inherent characteristics that make it intrinsically eligible for US Green Building Council LEED® credits. These include:

■ Energy & Atmosphere:

- Energy saving performance through consistently high permanent R-value.

■ Materials & Resources – MRc4 Credit Recycled Content:

- Is natural, inorganic material with up to 40% recycled content from products produced at the Milton facility.

■ Materials & Resources – MRc2 Credit Construction Waste Management:

- When removed undamaged, ROXUL insulation may be reused and recycled for other projects.

■ Indoor Environmental Air Quality:

- Naturally non-combustible without adding undesirable chemicals
- Chemically inert with no offgassing or emissions
- Resistance to growth of mold, fungi, and bacteria
- Will not sustain vermin
- CFC and HCFC-free product and process

■ Innovation & Design Process:

- Excellent sound absorption for occupants' acoustical comfort
- Exemplary performance for MRc4 (Recycled Content) and MRc5 (Region Content)

■ Regional Priority Credit (RPC1) for Durable Buildings (Canada):

- Dimensionally stable



The ROXUL® Difference

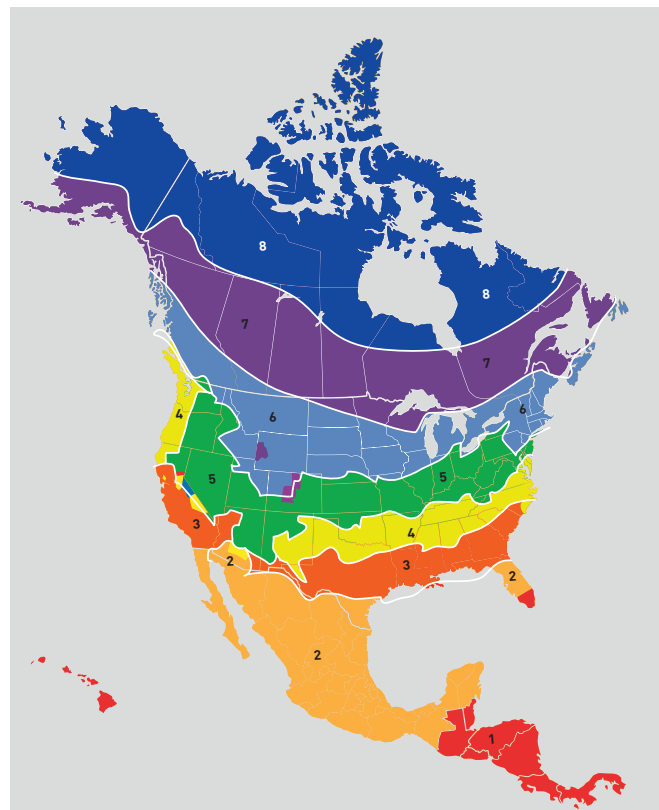
Long-Term Stable R-value Guaranteed



The R-value of ROXUL® roofing insulation does not change over time. Unlike foam plastics, stone wool is made from natural, inorganic stone to create natural fibers with no blowing agents, which off-gas and result in lower thermal performance. Since ROXUL insulation is dimensionally stable, the product maintains its thermal performance over its lifetime. Under real-life building conditions, it will hold its R-value even under freezing temperatures and yield the intended energy savings in the building. Where other insulation companies claim 10-20% loss in R-value over time, ROXUL maintains its full R-value. A new limited thermal warranty has been released, guaranteeing 100% of the originally declared R-value on all of its commercial roofing insulation products for up to 30 years. This is a first for the commercial insulation industry and is unmatched by any other insulation manufacturer in North America.

Climate Driven R-Values – What Value to Use

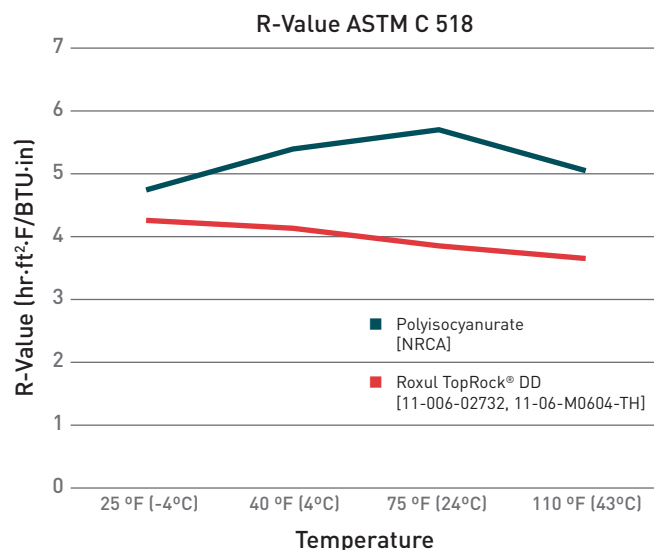
R-value is the measure of a material’s resistance to transmission heat from one side of the material to the other. “Stated” R-value is the thermal value of insulation when it is tested at 75 °F (24 °C). This is essentially room temperature where there is no need to insulate. Traditionally this value has been used for practical purposes; however the question that should be asked is how does the insulating material perform at other temperatures? Using “Climate Driven R-values” when designing buildings in various climate zones, acknowledges the thermal performance of insulation materials using more relative temperatures. For example, the stated R-value of polyisocyanurate (ISO) is often published as 6.0 per inch. The National Roofing Contractors Association (NRCA) tested the R-value of polyisocyanurate at various temperatures and found the R-value peaked at 75 °F (24 °C) and drastically decreased in R-value due to the condensing of blowing agents at lower temperatures. ROXUL insulation holds its values well into the freezing temperatures. The NRCA now recommends that designers use an aged R-value for ISO of R-5.0 in locations where heating degree days (HDD) dominate, and R-5.6 in locations where cooling degree days (CDD) dominate. As it applies to building performance, the benefits of stone wool insulation is just a starting point in the discussion.



ASHRAE Map of Climate Zones

Every rating agency has its own maps that divide regions into thermal or climate zones to tailor codes and standards to what is appropriate for that particular region.

TOPROCK® DD vs. Polyisocyanurate R-Value Comparison





ROXUL® Holds Up Year After Year

Dimensional Stability

ROXUL stone wool retains its physical characteristics over time. Unlike foam insulation materials, both TOPROCK® DD and MONOBOARD® will not expand or contract due to fluctuating temperatures, nor are they adversely affected by the presence of moisture, two critical factors that can compromise a building's roofing system. The exceptional stability of ROXUL stone wool eliminates stresses on the roofing membrane, and extends the overall service life of the roof.

- Stone wool is thermally stable and maintains its R-value over time
- No shrinkage due to off-gassing
- No thermal expansion/contraction due to temperature variance
- No warping or curling over time
- Life-cycle costing becomes more definitive

Comparison of Expansion Rates of Different Building and Insulation Materials

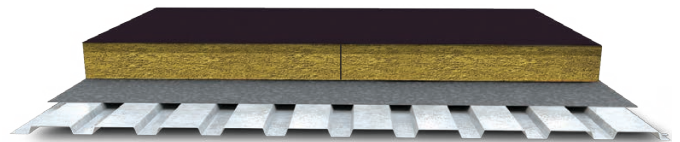
The thermal expansion coefficient expresses the rate at which materials shrink or expand when cooled or heated. ROXUL insulation has a much smaller thermal expansion coefficient than organic insulation products such as foam plastics. Higher expansion rates can cause shrinking and buckling of a system's insulation. Neglecting dimensional

stability characteristics can potentially result in the reduction of the effective R-values, increased energy costs, increased environmental impacts (CO₂) and the unexpected replacement of building materials due to stress and fatigue.

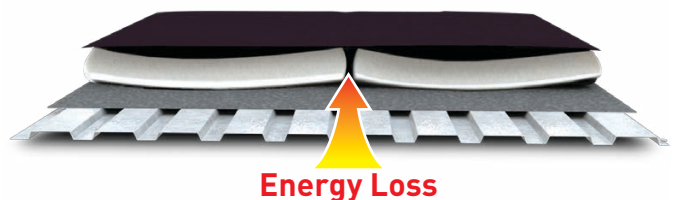
Comparison of Material Expansion Rates

| Material Type | Expansion Co-Efficient 10 ⁻⁶ m/m°C | Expansion at Temp. Difference of 50 °C or 90 °F on a 10 m/33 ft. |
|----------------------|--|--|
| Stone Wool | 5.5 | 3 |
| Concrete | 12 | 6 |
| Steel | 12 | 6 |
| Expanded Polystyrene | 70 | 35 |
| Extruded Polystyrene | 80 | 40 |
| Polyurethane | 100 | 50 |
| Polyisocyanurate | 120 | 60 |

ROXUL Insulation



Other Insulation





Engineered to Withstand High Traffic and Hail

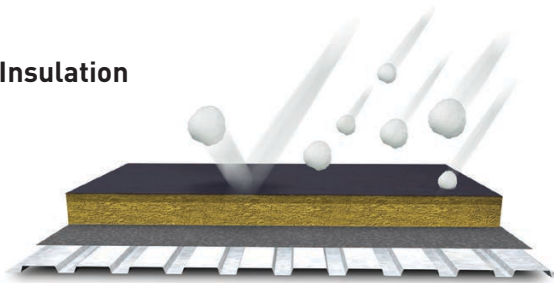
High Impact, High Performance

Heavy traffic and equipment, as well as environmental factors, can severely compromise the dimensional stability and thermal integrity of the roof system. TOPROCK® DD and MONOBOARD® have a high tolerance for point load impact versus foam insulation materials.

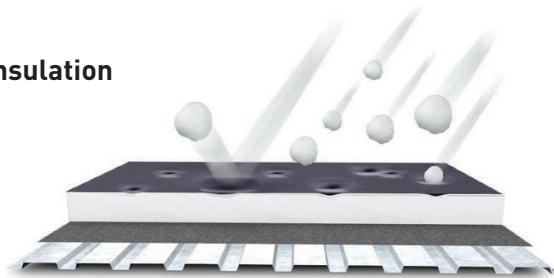
Stone wool has tested stronger and more forgiving than foam plastics, making it more resistant to environmental factors such as hail. Impact resistance testing with thermoplastic single-ply membranes over TOPROCK DD and MONOBOARD resulted in less damage than foam insulations and coverboards. TOPROCK DD was undamaged when compressed at 10%.



ROXUL Insulation



Other Insulation



Hail Performance

| Specification | Rating |
|---------------|----------------------------|
| FM 4470 | Class 1 – SH (Severe Hail) |
| FM 4473 | Class 4 |
| UL 2218 | Class 4 |

Compressive Strength

| TOPROCK DD | | |
|------------|------------------------------|-------------------------|
| ASTM C 165 | Top Layer – at 10%** | 20 psi (139 kPa) |
| | Top Layer – at 25% | 37 psi (252 kPa) |
| | Entire Board – at 10% | 11 psi (71 kPa) |
| | Entire Board – at 25% | 15 psi (103.5 kPa) |
| | Point Load @ 5mm Compression | 30 psi (250 kPa) |
| MONOBOARD | | |
| ASTM C 165 | 1" at 10% | 12 psi (85 kPa) |
| | 1" at 25% | 28 psi (190 kPa) |

Density

| TOPROCK DD | | |
|---------------|--------------|--|
| ASTM C 612-09 | Top Layer | 13.75 lb/ft ³ (220 kg/m ³) |
| | Bottom Layer | 10.0 lb/ft ³ (160 kg/m ³) |
| MONOBOARD | | |
| ASTM C 612-09 | | 12.5 lb/ft³ (200 kg/m³) |

● Improved Compressive Strength and Higher Density

●



Fire Resistant Insulation to Prevent Flame Spread and Toxic Smoke Development

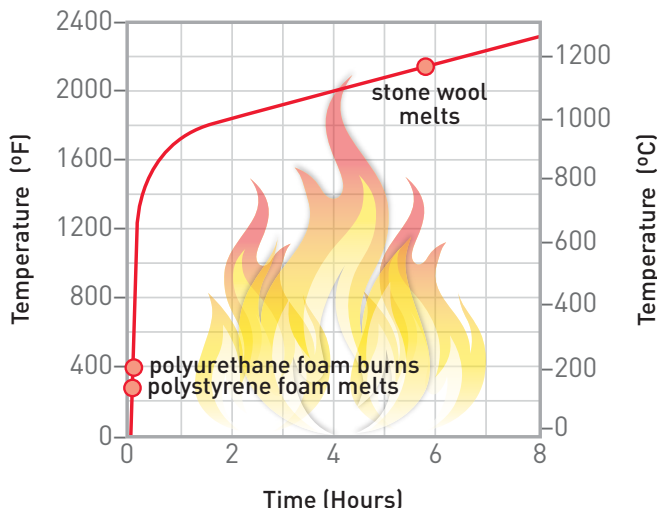
ROXUL® Stone Wool Insulation has a Melting Point that Exceeds the Temperatures of Most Commercial Fires

ROXUL stone wool roofing insulation is non-combustible and will not develop toxic smoke or promote flame spread, even when directly exposed to fire. Both TOPROCK® DD and MONOBOARD® products meet the requirements for the FM Approvals “NCC (Non-combustible Core) Rated Roof Insulation” rating.

They will therefore not add fuel to an existing fire, as foam plastics tend to do, making it ideal for use in high occupancy buildings.

Since stone wool does not contribute to a fire, it can provide valuable extra time for people to reach safety, a critical factor especially in health and education facilities. It can also provide fire services personnel additional time to control the spread of fire while reducing property damage.

Temperature Development In A Standard Fire (ASTM E119)



Are having sprinklers in a building adequate protection?

“Sprinklers are great in the building, but it is the smoke”

“It contains the fire, but not the smoke”

Transcript from Fire Fighters Focus Group, June 2012



ROXUL stone wool has an extremely high melting point of 2150 °F (1177 °C) compared to foam plastic at 400 °F (200 °C)

Designed for Simplified Application and Safer Installation

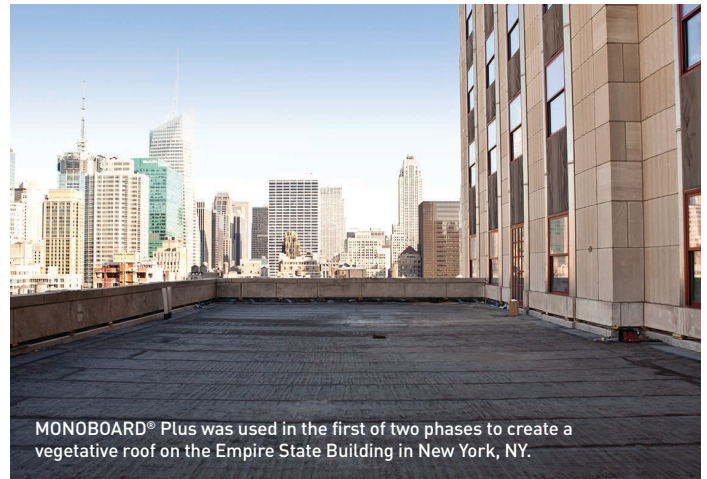
The Only Insulation You Can Directly Torch

The pre-applied bitumen coating on TOPROCK® DD Plus and MONOBOARD® Plus makes these insulation materials compatible with both torch and mop applied membranes, simplifying the application process and saving time as well as both material and labor costs on-site. The non-combustible, fire-resistance properties in stone wool insulation makes it a safe, versatile and appropriate solution for building owners and contractors during new construction, renovation, or ongoing maintenance.



Fire Performance

| Specification | Test | Result |
|------------------------------------|--|--|
| FM 4470 | NCC | Complies |
| CAN4 S 114 | Test for Non-combustibility | Non-combustible |
| CAN/ULC S 107-03 | Fire Tests of Roof Coverings | Class A |
| CAN/ULC S 126-06 | Fire Spread Under Roof Deck Assemblies | C7, C18, C28, C38 |
| ASTM E 84 (UL 723) CAN/ULC S102 | Surface Burning Characteristics | Flame Spread=0 Smoke Development=<5 |





Moisture Management Properties; Better Than Other Insulations

Repels Water

In the event that the membrane fails, TOPROCK® DD and MONOBOARD® are water repellent yet vapor permeable and will not promote rot, corrosion, mold or bacterial growth.

ROXUL® insulation has superior drying potential, minimizing the risk of condensation buildup, effectively managing stresses on the membrane from changes in temperature. The water vapor permeance of stone wool insulation allows for increased drying potential or “breathability” without trapping transient moisture in the assembly. Built up moisture can cause the formation of blisters and ridging, which can lead to leaks and premature failure of the roofing membrane. Stone wool allows trapped vapors in a roof assembly to disperse throughout the insulation layer and dry out, effectively maintaining moisture control.

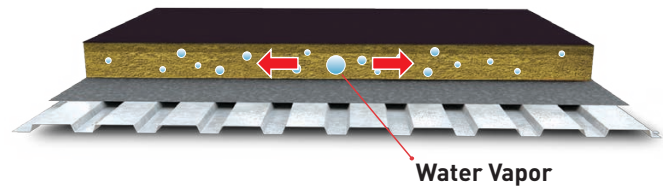


ROXUL TOPROCK DD and MONOBOARD will repel bulk water and disperse water vapor effectively managing moisture in the roof system for longer service life.

Moisture Resistant Properties

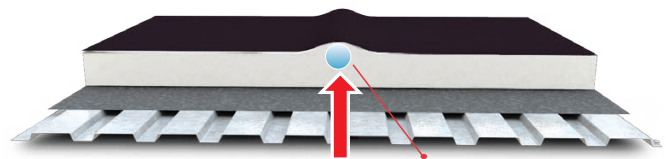
| Specification | Test | Result |
|-------------------|--|---------------------------------------|
| MONOBOARD | | |
| ASTM C 1104 | Water Vapor Sorption | 0.29% |
| ASTM E 96 | Water Vapor Transmission, Desiccant Method | 2360 ng/Pa.s.m ² (41 perm) |
| ASTM C 209 | Water Absorption | <1.0% |
| TOPROCK DD | | |
| ASTM C 1104 | Water Vapor Sorption | 0.15% |
| ASTM E 96 | Water Vapor Transmission, Desiccant Method | 2330 ng/Pa.s.m ² (41 perm) |
| ASTM C 209 | Water Absorption | <1.0% |

ROXUL Insulation



Water Vapor

Foam Insulation



Trapped Moisture



Minimizing Noise Pollution With Superior Sound Absorption

ROXUL® stone wool insulation products demonstrate superior sound absorption characteristics. The unique non-directional structure is denser than traditional insulations. This effectively reduces airflow and sound transmissions for excellent sound reduction. These denser structures, coupled with tight, seamless joints, create effective barriers to noise and contribute to a much quieter work environment.



CASE STUDY

Re-roofing Leads to Noise Reduction for Quiet Office Space

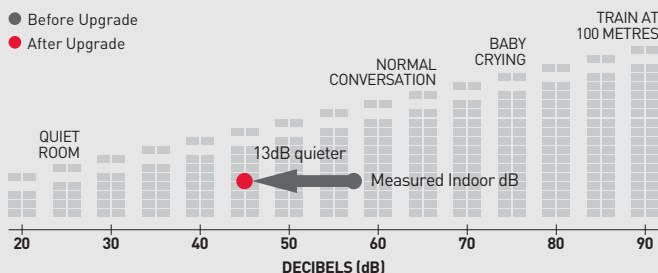
Project: Flynn Canada

Flynn Canada sits along the flight path of Pearson International Airport in Toronto, Canada, and is located within a kilometer of its busiest runway. When the company wanted to turn its previous warehouse into office space, it needed to address the noise level in the building. Valcoustics, an acoustical consulting company, performed acoustical testing on the building before and after the retrofit to assess the difference in noise transmission frequencies.

Solution: ROXUL TOPROCK® DD

TOPROCK DD was used over existing materials to retrofit the roof for noise reduction. The dual density product features a higher density top layer that provides strong point load resistance and effective load distribution.

Results:



“Substantial improvement in the indoor acoustical environment was achieved. Outdoor sound levels due to aircraft flyovers were reduced by up to 39 dB.”

“Based on the same sound level at the roof for the pre and post renovation condition, the indoor NC level has been reduced from **NC 61 to NC 39** with the indoor sound level dropping from **58 dBA to 45 dBA**. This reduction is a direct result of the roof upgrade, which included the addition of ROXUL TOPROCK DD 2.5 insulation.”

–Valcoustics Canada Ltd.

“Meetings are no longer interrupted by airport traffic noise due to 13 dB noise reduction after re-roof.”

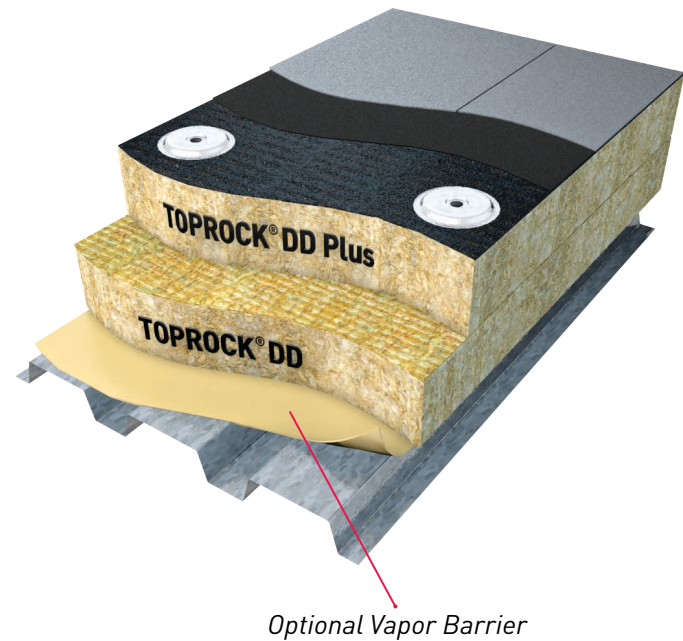
ROXUL® Products

TOPROCK® DD

Fire Resistant Roofing Insulation

ROXUL TOPROCK DD has exclusive stone wool dual-density properties that feature a higher density top layer providing strong point load resistance and effective load distribution to protect against puncture damage to the membrane, particularly during installation.

- Insulation and coverboard in one
- Suitable for new building, re-roofing, and re-cover applications
- Also used in tapered systems
- Intended for use with mechanically fastened and ballasted traditional single-ply membrane
- Standard thicknesses: 2", 2.5", 3", 3.5", 4", 4.5", 5", 5.5", 6"
- R-value of R3.8 per inch



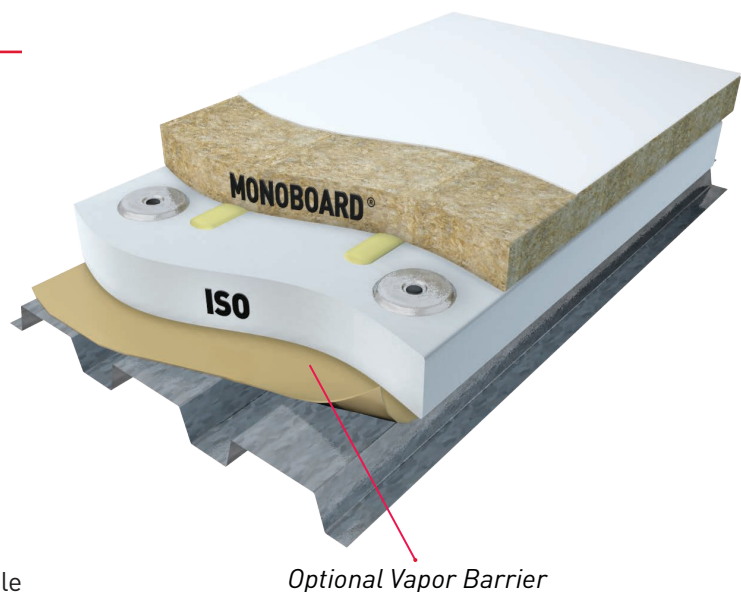
MONOBOARD®

- Improved Higher Density Coverboard

The Ultimate Insulating Coverboard

ROXUL MONOBOARD is a rigid, mono-density, roof cover board with a uniform density that can provide tremendous versatility and is designed for use as a coverboard and re-coverboard.

- Improved higher density **NOW 12.5 lb/ft³ (200 kg/m³)**
- Suitable for new building, re-roofing, and re-cover applications
- Also used in tapered systems and fabrications
- Standard thickness: 1.04"
- R-value of 4



TOPROCK DD Plus and MONOBOARD Plus are available with an impregnated surface layer of bitumen.

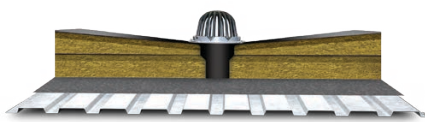
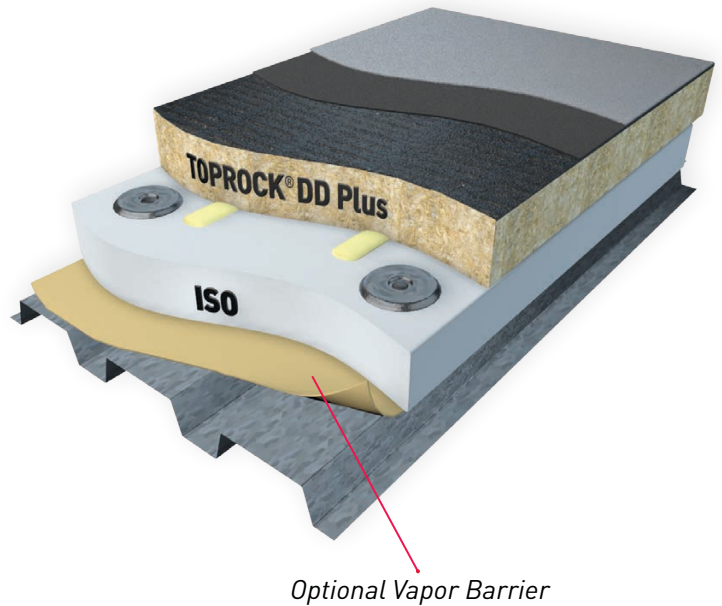
This pre-applied coating makes the products compatible with both torch and mop applied membranes, and simplifies the application process, saving time as well as both material and labor costs on-site.

What System is Best for Your Application?

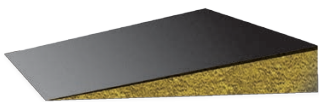
Why Use a Hybrid System?

TOPROCK® DD and TOPROCK® DD Plus are ideal products to use over various foam plastic roof insulation materials. ROXUL® insulation has the ability to protect more brittle materials from severe impact, and regulate unstable insulation materials from dimensional changes due to temperature variances – extending the life expectancy of the roof system. Similarly, MONOBOARD® and MONOBOARD® Plus offer the same benefits in an insulating coverboard.

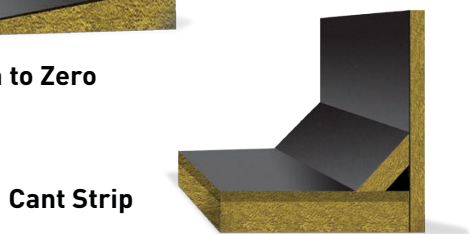
- Provides dimensional stability below the membrane
- Enhances long-term thermal performance
- Adds fire safety
- Absorbs sound
- Controls moisture build-up



Tapered System



Tapered Down to Zero



Cant Strip

Why Use a Tapered Roof System?

ROXUL roof insulation boards are ideal for designs that require tapered systems. The insulation cuts easily and cleanly to produce precise straight lines that **taper down to zero** and provide a tight, seamless fit.

- Fabrication is quick and easy, saving both time and money
- Water-resistant and vapor permeable to prevent the formation of blisters and ridging that can cause leaks and premature failure
- CAD designed and customized to suit your specific project needs, with easy-to-follow installation package for quick on-site assembly.

Ideal for Wooden Deck Applications

Both TOPROCK DD and MONOBOARD are well suited for recover applications with wooden decks. The products can be used for double-duty – as a fire barrier and a thermal insulation board, making it a long-term efficient solution that can save time as well as material and labor costs.



ROXUL® CEU Courses

ROXUL supports building industry professionals by offering a number of online Continuing Education Courses. Participants can earn 1 LU Hour for AIA/ CES and 1 NARI CEU for their participation. Please check our website updated course opportunities.

A Global Leader

ROXUL Inc. is part of ROCKWOOL® International, the largest producer of stone wool insulation, which is made from natural basalt rock and recycled material.

Rockwool International was founded in 1909 and today operates worldwide with more than more than 9,300 employees, with 27 factories in three continents.

Rockwool has more than 40 years experience in developing and manufacturing multipurpose insulation products for interior and exterior walls, ceilings, and roof underdecking. For 25 years, ROXUL has been serving the North American market.

In addition to TOPROCK® DD and MONOBOARD® rigid stone wool insulating roofing board, ROXUL also manufactures a range of other premium insulation products for multiple commercial applications.

Environmentally Sustainable

Our stone wool production process utilizes some of the most advanced technology available. The ROXUL facility is designed to capture and recycle rainwater, reduce energy consumption, and create zero waste to landfill by recycling raw materials back into the production process.

ROXUL insulations are created using naturally occurring, inorganic raw materials and materials with a high-recycled content. Stone wool insulation is non-combustible and achieves its thermal performance without the use of blowing agents. The products do not off-gas and are fully recyclable, therefore contributing to a sustainable environment.

ROXUL is the Better Insulation

ROXUL TOPROCK DD and MONOBOARD are innovative insulations offering a world of green features. When ROXUL is the specified insulation, green building developers can earn a variety of LEED® (Leadership in Energy and Environmental Design) points across four key categories toward sustainable development.



Roxul has released a new limited thermal warranty that guarantees 100% of the originally declared R-value on all of its commercial roofing insulation products for up to 30 years. This is a first for the commercial insulation industry and is unmatched by any other insulation manufacturer in North America. The new limited thermal warranty will be available in Canada, United States and Mexico. When installed in accordance with ROXUL instructions, ROXUL maintains the originally declared R-value as published on the Technical Data Sheets for the extent of the warranty. For more information on these warranties please contact a ROXUL sales representative in your area.



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